

In the Claims

81. (Withdrawn): An initiator for ATRP polymerization having the general formula:



wherein the core molecule Y comprises a small molecule or a macromolecule, a soluble or insoluble, organic, inorganic or composite molecule,

X is radically transferable atom or group, and

n is the number of radically transferable atoms or groups on the core molecule.

82. (Withdrawn): The initiator of Claim 81, wherein Y comprises an organic molecule which comprise soluble, swellable, or insoluble molecules, a synthetic molecule or a natural-based material, crosslinked support or other organic materials initially containing one or more functional group(s) that are or can be substituted by known chemical processes to form group(s) containing one or more radically transferable atoms or groups.
83. (Withdrawn): The initiator of Claim 82, wherein the organic molecule comprises a synthetic molecule or natural-based material.
84. (Withdrawn): The initiator of Claim 83, wherein the natural-based material is selected from the group consisting of cellulose, glucose, cotton, wool, and derivatives thereof, and wherein the natural-based material is soluble or insoluble in a reaction media.
85. (Withdrawn): The initiator of Claim 82, wherein the organic molecule initially comprises at least one functional group selected from the group consisting of a hydroxy, thiol, amine, amide, and mixtures thereof.
86. (Withdrawn): The initiator of Claim 81, wherein Y is the biodegradation product of a biodegradable polymer.
87. (Withdrawn): The initiator of Claim 81, wherein Y may be fragmented in a recycling process for the recovery of reusable polymer segments.

88. (Withdrawn): The initiator of Claim 81, wherein Y may be degraded by moisture in a process for the preparation of repulpable polymers.
89. (Withdrawn): The initiator of Claim 81, further comprising an inorganic molecule or an inorganic surface which initially contains functional groups or derivatives thereof that contain one or more radically transferable atoms or groups or functional groups.
90. (Withdrawn): The initiator of Claim 81, wherein Y comprises a silica surface, a siloxane cube or a cyclotriphosphazene ring.
91. (Withdrawn): (Currently Amended): A macroinitiator for ATRP polymerization of free radically (co)polymerizable monomers, comprising:
- ~~a reaction product formed by a polymer block comprising monomeric units derived from a~~ ring opening (co)polymerization of cyclic monomers or oligomers comprising a free radically transferable atom or group as a substituent.
92. (Withdrawn): (Currently Amended): The macroinitiator of Claim 91, wherein the ring opening (co)polymerization of cyclic monomers or oligomers is performed in the presence of a capping agent, and wherein the capping agent comprises a ~~a~~ radically transferable atom or group.
93. (Withdrawn): A polydimethylsiloxane macroinitiator prepared by the process of Claim 92.
94. (Withdrawn): (Currently Amended): A polyphosphazene multifunctional macroinitiator for an ATRP (co)polymerization, comprising: ~~the reaction product formed by a polymer block comprising monomeric units derived from a~~ ring opening polymerization of cyclic hexachlorotriphosphazene followed by a reaction with a nucleophile containing radically transferable atoms of groups.
95. (Withdrawn): (Currently Amended): A polyphosphazene based functional polymeric macroinitiator for an ATRP (co)polymerization, comprising ~~a polymer block comprising~~

monomeric units derived from the reaction product of a ring opening polymerization of cyclic hexachlorotriphosphazene followed by a reaction with a first nucleophile and a second nucleophile, wherein the first nucleophile optionally contains radically transferable atoms or groups, and wherein the ratio of first nucleophiles to second nucleophiles that contain radically transferable atoms or groups to nucleophiles that do not contain radically transferable atoms or groups is from 99.98 to .01%.

96. (Withdrawn): A supported initiator for ATRP polymerization, formed by treating a surface with a molecule comprising a first functionality capable of reacting with said surface and a second functionality comprising one or more radically transferable atoms or groups.
97. (Withdrawn): The supported initiator of Claim 96, wherein the surface is an inorganic surface.
98. (Withdrawn): The supported initiator of Claim 96, wherein the surface is an organic surface.
99. (Withdrawn): A supported initiator of Claim 97, wherein the inorganic surface is a silica surface and the molecule comprises a substituted silane.
100. (Withdrawn): (Currently Amended): A macroinitiator for ATRP, comprising a polymer block comprising monomeric units derived from a reaction product of a polymerization in the presence of a transfer agent, wherein the transfer agent comprises a radically transferable atoms or groups.
101. (Withdrawn): (Currently Amended): A polyvinyl acetate macroinitiator for ATRP, comprising a polymer block comprising monomeric units derived from a reaction product of a polymerization in the presence of a chain transfer agent, wherein the chain transfer agent comprises a radically transferable atom or group.

102. (Withdrawn): (Currently Amended): A macroinitiator for ATRP, comprising a polymer block comprising monomeric units derived from a reaction product of a living anionic polymerization, wherein the polymerization is quenched with a molecule comprising a radically transferable atom or group.
103. (Withdrawn): (Currently Amended): A macroinitiator for ATRP of free radically (co)polymerizable monomers, comprising a polystyrenic reaction product of conducting a polymer block comprising monomer units derived from a living cationic polymerization of styrene; and capping the resulting living cationic polymerization product by a styrene block comprising one or more styrene units, wherein the polystyrenic reaction product comprises a radically transferable atom or group on a styrene termini.
104. (Withdrawn): (Currently Amended): A polyolefin (co)polymer macroinitiator, comprising a reaction product of reacting a polyolefin (co)polymer block; and with at least one small molecule containing a radically transferable atom or group.
105. (Withdrawn): (Currently Amended): The polyolefin (co)polymer macroinitiator of Claim 104, wherein the small molecule is comprising one of a halogen or and sulfonyl halide.
106. (Withdrawn): (Currently Amended): An initiator for the preparation of a "bottle brush" or comb shaped (co)polymer, comprising a reaction product of a polymer block comprising monomeric units derived from a linear polymerization of a monomer comprising a radically transferable atom or group, wherein the reaction product comprises an oligomer or polymer with and a radically transferable atom or group residing on each monomer unit.
107. (Withdrawn): (Currently Amended): An initiator for the preparation of a "bottle brush" or comb shaped, or graft (co)polymers, comprising a reaction product of conducting a polymer block comprising monomeric units derived from a linear (co)polymerization of a monomer containing a radically transferable atom or group with a second monomer; that

does not contain a functional group, wherein the reaction product comprises an oligomer or polymer with a known level of and radically transferable atom or groups on the average polymer chain.

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108. (Withdrawn): A multifunctional initiator for an ATRP polymerization to give a "bottle brush" or comb shaped (co)polymer, comprising a reaction product of a polymer block comprising monomeric units derived from a linear polymerization of a monomer containing a functional group; wherein the linear polymerization product comprises an oligomer or polymer comprising said functional group residing on each monomer unit and further reaction of said functional group residing on each monomer unit and further reaction of said oligomer or polymer comprising said functional group with and a compound group containing a radically transferable atom or group, and wherein said reaction product comprises the multifunctional initiator is a polymer with one or more radically transferable atoms or groups on each monomeric unit.

109. (Withdrawn): (Currently Amended): A macromolecular initiator for the ATRP (co)polymerization for form graft or "bottle brush" copolymers, comprising a reaction product a polymer block comprising monomeric units derived from of reacting a mixture of first compounds that contain a radically transferable atom or group and second compounds that do not contain a radically transferable atom or group with the linear polymerization product of Claim 108, wherein said reaction product comprises a controlled number of radically transferable atoms or groups randomly distributed along the reaction product chain.

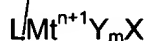
110. (Withdrawn): A multifunctional macroinitiator for preparation of a block copolymer with one or more "bottle brush" block(s), wherein at least one of the blocks in said block copolymer is prepared from a monomer containing a radically transferable group, or a

group that can be converted to a group containing a radically transferable atom or group.

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111. (Withdrawn): An initiator for a controlled polymerization process, which can be isolated or used in-situ, for the polymerization of free radically (co)polymerizable monomers, formed by the capture of a (functional)-free radical having the structure:



by reaction with a transition metal compound of the structure:



wherein Z is any functional group, including non-reactive groups, that does not interact during an ATRP polymerization process,

Mt^{n+1} is a reaction metal in the oxidation state $n+1$, wherein and X is a radically transferable counterion,

Y_m may either be the same as X, a radically transferable counterion different from X, or a non-transferable counter ion, and

in the presence of solubilizing ligand(s) L,

wherein X is transferred from the metal compound to the free radical, creating a molecule of structure (III),



that can be isolated, or directly used as an initiator for controlled free radical

(co)polymerization of monomers, optionally present in the system, through a catalyzed redox reaction with the metal compound now converted into a metal compound of lower oxidation state having the structure:



wherein Mt, X and Y are defined as above, and

I* is a substituted C, S, O, N, P, Sn, or any other atom that can form a free radical by any process.

112. (Withdrawn): The initiator Claim 111 wherein the said free radical is first formed by the decomposition of an organic peroxide, organic persulfate, inorganic persulfates, peroxydisulfate, azocompounds, peroxycarbonates, perborates, percarbonates, perchlorates, peracids, hydrogen peroxide, and mixtures thereof, optionally containing a functional group that does not interact in ATRP.
113. (Withdrawn): The process of Claim 111, wherein the transition metal complex is chosen to render the polymerization system homogenous.
114. (Withdrawn): The process of Claim 111, wherein the monomers include substituted or unsubstituted acrylates, methacrylates, (meth)acrylamides and (meth)acrylonitriles.
115. (Withdrawn): The process of Claim 111, wherein one or more of the radically transferable atom(s) or group(s) present on the transition metal complex in its higher oxidation state is a halogen.
117. (Original): A multifunctional polymerization initiator compound, comprising:
at least one radically transferable atom or group capable of initiating an atom transfer radical polymerization; and
at least one initiation group capable of initiating at least one of a cationic, an anionic, a peroxide initiated free radical, a controlled free radical, metathesis, ring opening and coordination polymerization process.
118. (Original): The multifunctional polymerization initiator compound of claim 117, wherein the at least one initiation group comprises a peroxide group.
119. (Previously Amended): A macroinitiator for polymerization processes, comprising:
a free radical polymerization initiator group comprises at least one of an azo group and a peroxy group;

- at least two polymer blocks each comprising methacrylate monomeric units attached to the convention free radical polymerization initiator group.
120. (Original): A macroinitiator for polymerization processes, comprising:
- a polymer block comprising radically polymerizable monomers; and
 - a free radical polymerization/initiation group.
121. (Original): The macroinitiator for polymerization processes of claim 120, wherein the polymer block comprises monomer units derived from dimethyl aminomethyl methacrylate monomers.
122. (Original): A macroinitiator for polymerization processes, comprising:
- a polymer block, comprising at least one monomer unit derived from monomers capable of being polymerized by a process selected from the group consisting of cationic, anionic, free radical, controlled free radical, metathesis, ring opening, and coordination polymerization processes; and
 - at least one radically transferable atom or group capable of initiating an atom or group transfer radical polymerization.
123. (Original): The macroinitiator for polymerization processes of claim 122, wherein the monomer units are derived from at least one of a styrene, a vinyl chloride, and a vinyl acetate; and further comprising a second polymer block comprising monomer units derived from at least one monomer selected from the group consisting of substituted styrene(s), (meth)acrylates, (meth)acrylonitrile, (meth)acryamides, and other radically polymerizable monomers capable of being polymerized by an atom or group transfer radical polymerization.
124. (Currently Amended): A macroinitiator for polymerization processes, comprising:
- a polymer block:
 - at least two radically transferable atoms or groups capable of initiating an atom

or group transfer radical polymerization process; and

at least one initiation group capable of initiating a free radical polymerization process.

125. (Original): The multifunctional polymerization initiator compound of claim 117, wherein the radically transferable atoms or groups comprise:

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Cl, Br, I, OR^{10} , SR^{14} , SeR^{14} , $\text{OP}(=\text{O})\text{R}^{14}$, $\text{OP}(=\text{O})(\text{OR}^{14})_2$, $\text{OP}(=\text{O})\text{OR}^{14}$, $\text{O}-\text{N}(\text{R}^{14})_2$ and $\text{S}-\text{C}(=\text{S})\text{N}(\text{R}^{14})_2$, where R^{10} is alkyl of from 1 to 20 carbon atoms in which each of the hydrogen atoms may be independently replaced by halide, R^{14} is aryl or a straight or branched C_1 - C_{20} alkyl group, and where an $\text{N}(\text{R}^{14})_2$ group is present, the two R^{14} groups may be joined to form a 5- or 6-membered heterocyclic ring; and

R^{11} , R^{12} and R^{13} are each independently selected from the group consisting of H, halogen, C_1 - C_{20} alkyl, C_3 - C_8 cycloalkyl, $\text{C}(=\text{Y})\text{R}^5$, $\text{C}(=\text{Y})\text{NR}^6\text{R}^7$, COCl , OH , CN , C_2 - C_{20} alkenyl, C_2 - C_{20} alkynyl oxiranyl, glycidyl, aryl, heterocyclyl, aralkyl, aralkenyl, C_1 - C_6 alkyl in which from 1 to all of the hydrogen atoms are replaced with halogen and C_1 - C_6 alkyl substituted with from 1 to 3 substituents selected from the group consisting of C_1 - C_4 alkoxy, aryl, heterocyclyl, $\text{C}(=\text{Y})\text{R}^5$, $\text{C}(=\text{Y})\text{NR}^6\text{R}^7$, oxiranyl and glycidyl;

where R^5 is alkyl of from 1 to 20 carbon atoms, alkoxy of from 1 to 20 carbon atoms, aryloxy or heterocyclyloxy; and R^6 and R^7 are independently H or alkyl of from 1 to 20 carbon atoms, or R^6 and R^7 may be joined together to form an alkylene group of from 2 to 5 carbon atoms, thus forming a 3- to 6-membered ring; such that no more than two of R^{11} , R^{12} and R^{13} are H.

Restriction

Applicants herein elect, without traverse, Group II for further prosecution in the subject application.